REMARKS

This paper is being provided in response to the Office Action dated June 21, 2005, for the above-referenced application. In this response, Applicants have amended claims 1 and 6 and added claims 9-16 to clarify that which Applicants consider to be the invention. Applicants respectfully submit that the amendments to the claims and the new claims are fully supported by the originally-filed application.

The rejection of claims 1, 2, 3 and 5-8 under 35 U.S.C. 103(a) as being unpatentable over JP Patent No. 4-35107 to Morita et al. (hereinafter "Morita") in view of JP Patent No. 2001-110264 to Satoshi et al (hereinafter "Satoshi") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

Claim 1, as amended herein, recites a crystal unit that includes a crystal blank having a hole portion defined in at least one principal surface thereof, providing a vibrating region in a portion of the crystal blank which is made thinner by the hole portion, excitation electrodes disposed respectively on opposite principal surfaces of the crystal blank in the vibrating region, extension electrodes extending respectively from the excitation electrodes to respective first and second positions on an outer peripheral portion of the crystal blank, and a casing. Claim 1 also recites that the crystal blank has a single fixed end electrically and mechanically connected to the casing by eutectic alloy in the first position and the extension electrodes is electrically connected to the casing by wire bonding in the second position. Claims 2, 3, and 5 depend from claim 1.

Claim 6, as amended herein, recites a structure for holding a crystal blank having a hole portion defined in at least one principal surface thereof, providing a vibrating region in a portion of the crystal blank which is made thinner by the hole portion. Claim 6 also recites that the

crystal blank supports thereon excitation electrodes disposed respectively on opposite principal surfaces of the crystal blank in said vibrating region, and extension electrodes extend respectively from the excitation electrodes to respective first and second positions on an outer peripheral portion of the crystal blank. Claim 6 also recites that the crystal blank has a single fixed end electrically and mechanically connected to a holder by eutectic alloy in the first position and the crystal blank has a free end on which wire bonding wires are connected to the extension electrodes in the second position. Claims 7 and 8 depend from claim 6.

Morita discloses a crystal block (14) having a recessed part (15) formed in the middle thereof to provide ridges (17) around the circumference of the crystal block (14).

Satoshi discloses a crystal oscillator that is produced by bonding holding crystal on both principal surfaces of an oscillator crystal. Satoshi discloses that the eutectic alloys are formed and laminated on the outer circumference of both principal surfaces of the oscillator crystal and the outer circumference of the holding crystal opposite to the oscillator crystal.

As described in the present specification, when a crystal blank is fixed to a casing by way of electrically conductive adhesive in a crystal unit having a vibration frequency of 100 MHz or higher, an organic gas component generated from the conductive adhesive attaches to the vibrating area of the crystal blank and causes the change in the vibrating frequency of the crystal unit thereby impairing the aging characteristics of the crystal unit. A solution of this problem would be to use a eutectic alloy having a low melting point. However, as described in page 4, lines 1 to 14 of the specification, since a connection made by a eutectic alloy has a high bonding strength, a crystal blank connected to the casing at two or more points may be is strained due to the difference between the coefficients of thermal expansion of the crystal blank and the casing. The strain may be propagated to the vibrating region of the crystal blank, impairing the vibrating characteristics of the crystal blank, in particular, frequency vs. temperature characteristics that

will be represented by a cubic function curve if the crystal blank comprises an AT-cut quartz crystal blank.

In order to reduce the strain due to the difference in the thermal expansion coefficients, the present invention is characterized in that the crystal blank is fixed to the casing at a single point by eutectic alloy. Since the crystal blank is rigidly fixed to the casing at the single point, the strain due to the difference in thermal expansion coefficient between the crystal blank and the casing is minimized.

Applicants respectfully submit that neither Morita, nor Satoshi, nor any combination thereof, show, teach, or suggest Applicants' recited feature wherein the crystal blank has a *single* fixed end electrically and mechanically connected to the casing. Neither reference appears to be aware of any problem relating to use of the electrically conductive adhesive, including the problem of the strain due to the difference in the thermal expansion coefficients when the crystal blank is fixed to the casing at the two points by eutectic alloy.

As described in the present application, having a single fixed end that is electrically mechanically connected to the casing provides significant advantages over having multiple mechanical and electrical connections between the crystal blank and the casing. See, for example, prior art FIG. 3A and FIG. 3B of the present application and the corresponding discussion regarding the disadvantages of multiple electrical and mechanical connections between the casing and the crystal blank.

Note that it is not clear from Morita how the crystal blank is connected to the casing while Satoshi specifically discloses multiple electrical and mechanical connections (i.e., *both* principle surfaces) between the crystal blank and the casing. Thus, neither reference discloses the recited feature of a single electrical and mechanical connection and, in fact, one of ordinary

skill in the art combining Morita and Satoshi would in all likelihood provide a device having multiple electrical and mechanical connections between the crystal and the casing (as taught by Satoshi), which is contrary to the specific recitation in the claims as amended herein. Accordingly, Applicants respectfully request that this rejection be withdrawn.

The rejection of claim 4 under 35 U.S.C. 103(a) as being unpatentable over Morita in view of Satoshi and further in view of JP Patent No. 2001-237665 (hereinafter "the '665 patent") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claim 1 are discussed above with respect to Morita and Satoshi. Claim 4 depends thereon.

The '665 patent is cited in the Office Action as disclosing a pillow member.

Applicants respectfully submit that the '665 patent does not overcome the above-noted deficiencies of Morita and Satoshi with respect to Applicants' claim 1 as amended herein. Accordingly, Applicants respectfully request that this rejection be reconsidered and withdrawn.

Based on the above, Applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 508-898-8603.

Respectfully submitted,
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